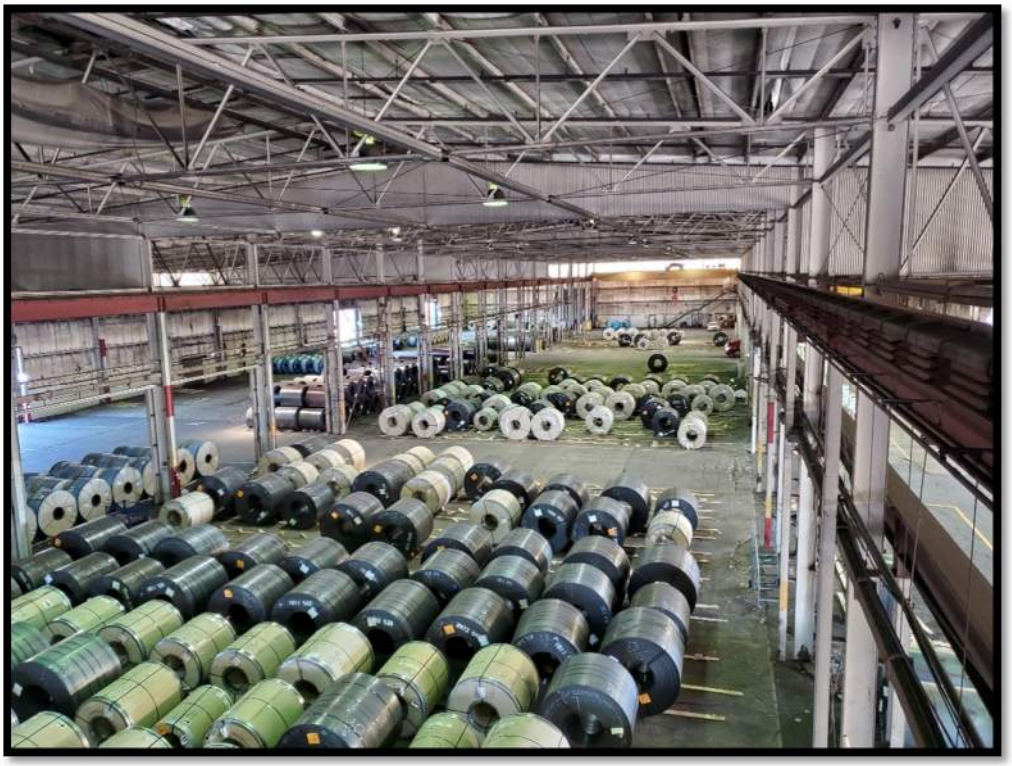
Exhibit G

VISUAL INSPECTION/EVALUATION REPORT OF

Crane Runway, Warehouse A

Middle Bay



Prepared by Osborn Engineering
October 2021
Cleveland, Ohio

OSBORN ENGINEERING

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APPENDICES

Introduction

Description

The Port of Cleveland (POC) is one of the largest ports on the Great Lakes. Over 20,000 jobs and $3.5 billion in annual economic activity are tied to the roughly 13 million tons of cargo that move through Cleveland Harbor each year. The Port of Cleveland is the only local government agency whose sole mission is to spur job creation and economic vitality in Cuyahoga County. The Port is an economic engine for our community, a key to Northeast Ohio's global competitiveness, and a crucial partner in building Cuyahoga County's future.

The above stated purpose of the Port of Cleveland directly relates to the activity of the crane runways and rail systems that are covered in this report. The Port operates overhead crane runway systems, specifically in Warehouse A, which receive constant loading as well as wear and fatigue forces that create operational and safety issues over time. To ensure the health and safety of all workers performing general work and maintenance activities around these systems, a proper inspection of the structural makeup and systems is required. In this regard, Osborn Engineering was on site from September 8th through September 9th, 2021 and has completed an inspection of the crane rails and supporting systems in accordance with OSHA regulations and ANSI/ AISC standards within the middle bay of Warehouse A. Our inspection does not include testing of the rail or crane system or any of the operating mechanisms that make up the overhead crane runway systems. Inspections were performed on unobstructed elements; selective demolition for access to specific areas was not performed under any circumstance.

Inspection Procedure

Osborn's inspection team followed competent person guidelines and engineering principles for the inspections. When feasible, structural inspection guides, such as the Ohio Department of Transportation's Manual of Bridge Inspection (ODOT's MBI) was utilized for steel elements along with associated deterioration descriptions. All crane girder tie-backs (or hold-downs), seat connections, rivets, bolts, anchorages, columns, cross-bracing and associated elements were inspected for signs of deterioration, wear and overstress in accordance with the above-noted guidelines. The inspection of these elements was performed visually from a manlift (supplied by POC), and hands-on as needed to obtain a closer view of all elements. Photos were taken to document inspected areas, especially where deterioration or maintenance items were of general concern. A sounding hammer was utilized for rivets and bolts; when needed, or when detection of loose or unsound bolts was prevalent, wrenches were used. When match-marks were encountered on bolts and rivets, they were sounded and left in place if adequate/sound and no movement was noted. When bolts and rivets that had not been match-marked were encountered, the team placed new marks on random connecting elements.

Inspection Results

A complete list of the condition elements, description of deterioration, and required maintenance recommendations or repairs are listed below in summary form for each column line section, east and west, and W beam sections (broken down into segments between columns). See Appendix A for Plan Layouts of the inspected areas. Detailed spreadsheets of the condition rating definitions, outlines of each column area and uncovered deficiencies are also included in Appendices C and D.

Crane Runway, Inspection Procedures

The Middle Bay was inspected from both east and west column lines as denoted above. Figure 1 shows a typical area where equipment, lumber, steel coils and general utility, power lines/wires were encountered during the inspection. The columns and cross-bracing were inspected from the ground and visually using binoculars when needed and up to approximately fifteen feet (15'). Additionally, the Snorkel manlift was used to gain access to the beam lines, crane rails, bearing areas and upper portions of the columns.

Figure 1 – Typical work area and column lines

Figure 2 below shows typical inspection procedures utilizing the manlift. The Column Line inspections, both east and west, consisted of column lines 1 through 26. Some tops/columns and rail/beam sections were not inspected up close due to multiple access issues, steel coils, and/or equipment. The end sections were only visually inspected from a distance to the north (column lines 1 and 2) due to the crane in the parked or stationary condition. Each of the above areas was coordinated with POC project managers, on-site personnel and supervisors as needed.

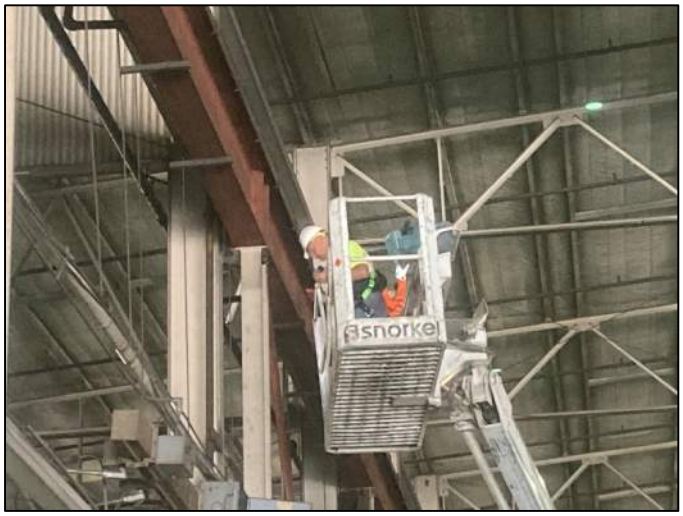

Figure 2 – View of inspection manlift

Structural Observations, Column Summaries

Column Lines, east and west, were inspected as described above from both ground level and the manlift. The columns had multiple areas of impact damage typically, and concrete protection jackets on selected columns, most likely as determined from ingress/egress passageways and travel of heavy equipment in specific bays (Figure 3).

It should be noted that POC management has placed a temporary stop block at/near column C20 as the west column has multiple impact dents up to 1½" and is deflected approximately 3" off center and up to five feet above the base plate. The crane rail currently stops at or near column line 19. In addition, most of the cross-bracing had multiple kinks, dents or impact damage throughout the elements or members. The columns also had typical channel sections welded on the backside of each in third segments, or distinct points along the webs (Figure 4).

Figure 3 – Typical concrete encasement

Figure 4 – Typical channel section welded to column

Figure 5 – Typical cross-bracing

Figure 6 – Typical plates welded to column flanges

Column typical deficiencies and sections are shown throughout Figures 3 through 9. The maintenance recommendations are shown in the Excel spreadsheet and are discussed in the following sections.

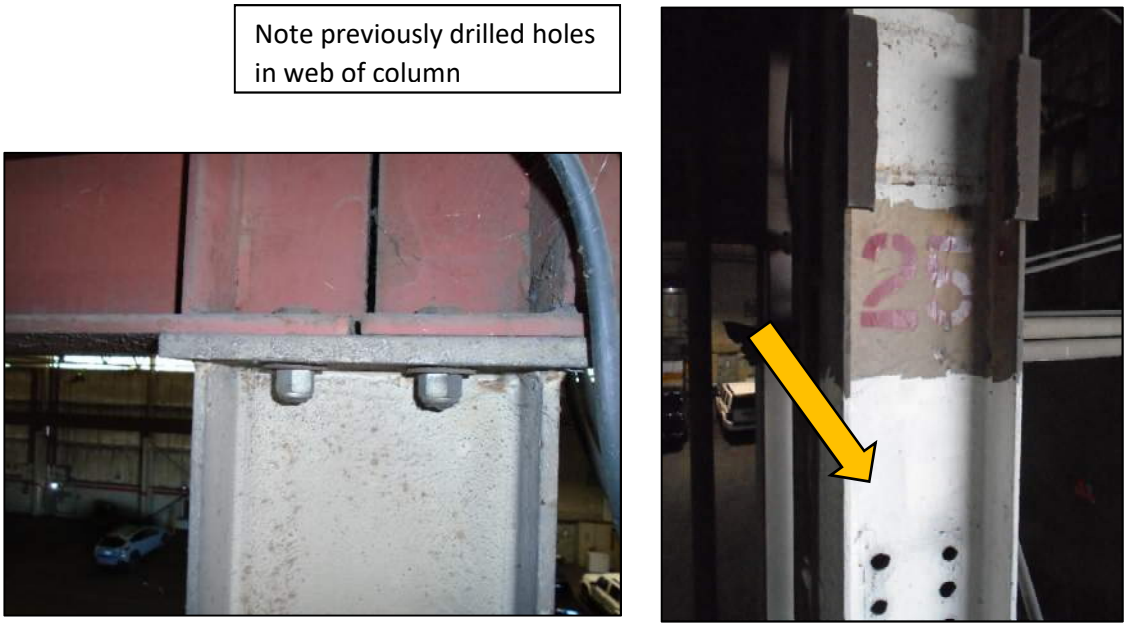

Figure 7 – Typical bearing area and upper column (left) and holes in web (right)

Figure 8 – Typical gusset plate at column

Figure 9 – Impacted column

All inspected areas and structural members/elements were transferred to a working Excel spreadsheet to document and compile denoted deficiencies. Figure 10 below shows a typical view or sampling from the spreadsheet. The 0 – 9 Condition Rating was utilized from ODOT's Manual of Bridge Inspection and modified to fit the structural columns and crane rail beams and structural elements. A rating of 9 is a like new or excellent condition while a rating of 0 is a failed condition. A general scale or rating table is provided and additional explanatory documents for alignment, steel and cross-bracing are also included in the spreadsheet.

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Inspection Report - Crane Structural System

Location:	Warehouse A - Column Elements (WEST)
Inspection Date:	9/8/2021 and 9/9/2021
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman

Component	9-0 Condition (Dropdown)	Inspection Notes
Column - C1	7 - Good	Minor scrapes on paint.
Column - C2	8 - Very Good	Minor scrapes, dirty.
Column - C3	7 - Good	Concrete-encased. Minor concrete impact damage.
Column - C4	7 - Good	Concrete-encased. Surface deterioration, spalls and scrapes on concrete.
X-Bracing (C4L-C5U)	2 - Critical	Gusset is partially encased in concrete. Impact damage causing deflection; bent, dings and corroded.
X-Bracing (C5L-C4U)	2 - Critical	Gusset is partially encased in concrete. Impact damage causing deflection; bent, dings and corroded.
Column - C5	7 - Good	Minor scrapes on paint.
Column - C6	5 - Fair	Impact kinks/dents ~2'-6" up from base (dents range from ½" to 1½").
Column - C7	2 - Critical	Impact kinks/dents @ 6' from base (~¾"); web is deformed ½" and column is beginning to twist. Impact to web is approx. 10" from base.
Column - C8	5 - Fair	Multiple impact kinks/dents (~1" to 1½") @ 6' up from base.
Column - C9	7 - Good	1/4" gouge in south flange; minor scrapes on paint.
Column - C10	7 - Good	Concrete-encased. Minor cracks beginning in concrete.
Column - C11	6 - Satisfactory	1/4" impact dent ~2' from base and another at 6' up from base.
Column - C12	5 - Fair	1/4" impact kink/dent 3' up from base; column is showing 1" deflection from 3.5' to 6' from base.
Column - C13	6 - Satisfactory	3/4" impact dent/kink ~2' up from base.
X-Bracing (C13L-C14U)	2 - Critical	Impact dents/kinks causing deflection and twisting.
X-Bracing (C14L-C13U)	2 - Critical	Multiple impact dents causing deflection & distortion of member.

Figure 10 – Excerpt from spreadsheet

Typical notations utilized throughout this report and the enclosed appendices are shown below.

LEGEND:

GP = Gusset plate
PL = Plate
L = Lower
U = Upper

Maintenance Recommendations – Columns

The following recommendations are based on the safety inspection and Osborn's site visit. Other specific recommendations are listed in Appendix B combined with representative photos.

1. All horizontal surfaces had dirt, debris, grease, oil, corrosion flakes and metal shards on them. Good maintenance practices recommend that these areas (flanges, seats and bearings, and plates) be cleaned by power washing or equal, especially prior to inspections so that cracks, deficiencies and other elements can be clearly visualized. After this has been accomplished, steel areas should be cleaned and repainted.
2. The cross-bracing members should all be replaced.
3. Repair concrete-encased members as needed, and determine long-term Capital Plans for placing this detail at all columns as follows:
    a) Determine the most heavily traveled bays or ingress/egress;
    b) Repair or replace the columns per the maintenance recommendations;
    c) Prioritize the above zones and begin at high volume areas placing concrete encasement.
4. Check/inspect all welds and webs surrounding channel stabilizing sections placed on the backside of the columns for cracks, punching of the steel, or deformations due to multiple impacts. (Note: both crane rail columns and warehouse structural columns should be inspected)
5. In areas of previously-drilled holes in the webs and/or flanges of the columns, place oversized steel plates sandwiched over the whole area (covering the entirety of the bolt pattern), welded or bolted in place.
6. Tighten all loose bolts at bearing areas (tops/columns) to the proper torque.
7. Depending on the frequency of use, the available capacity of the crane rails should be determined. In addition, all superstructure (girders) and substructure (columns, GP's, knee braces, diaphragms and supporting units) elements should receive a load rating. Fatigue in these types of elements is a major concern and should also be investigated.

MAINTENANCE RATING & RECOMMENDATIONS

OSBORN ENGINEERING

	Level 1	Level 2	Level 3	Level 4	Level 5	Maintenance Recommendation Notes
C1W					X	Clean & paint
C2W					X	Clean & paint
C3W				X		
C4W				X		
XB4-5	X					Members should be replaced
XB5-4	X					Members should be replaced
C5W					X	Clean & paint
C6W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet
C7W	X					Impacted portion, or complete member, should be replaced
C8W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet
C9W				X		Clean & paint
C10W				X		
C11W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet

Figure 11 – Excerpt from Maint. Recs. spreadsheet

Structural Observations, Beam & Crane Rail Summaries

The W-beam sections, channel bases, crane rails and all bearing areas and connections, east and west, were inspected as described above from the manlift. The beams overall were in satisfactory condition with minor issues such as pinpoint rusting, corroded areas, thin or faded coatings, dirt and debris lying on lower flanges and small improper seating issues at the tops of columns. The seated channels, lying on their sides to carry the crane rails, were in a similar satisfactory condition with dirt and some corrosion beginning.

The crane rails overall were also in satisfactory to fair condition. There were some areas of loose hold-downs or anchors, some splice plate bolts were loose, and in a few areas the rail was slightly misaligned. In a few areas the crane rail had a small gap below it between the rail and channel section. Finally, in one (1) area, the splice plates for the crane rail seemed to be missing – W12-13 (Figure 15).

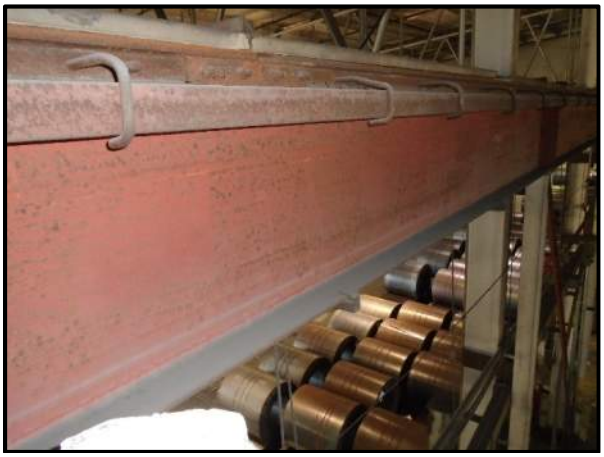


Figure 12 – Typical beam and rail condition

Figure 13 – Typical channel section with crane rail

Figure 14 – Match-marked bolts at splice plate

Figure 15 – Missing splice plate at W12-13

Typical deficiencies and sections of the beams, crane rails, connections and bearing areas are shown throughout Figures 14 through 18. The maintenance recommendations are shown in the Excel spreadsheet and are discussed in the following sections.

Figure 16 – Loose bolt and missing bolt (left) and bearing connection detail (right)

Figure 17 – Typical utility hangers at west

Figure 18 – Offset of channel sections, C20W

All inspected areas and structural members/elements were transferred to a working Excel spreadsheet to document and compile denoted deficiencies (Figure 19). The 0 – 9 Condition Rating was utilized from ODOT's Manual of Bridge Inspection and modified to fit the structural columns and crane rail beams and structural elements. A rating of 9 is a like new or excellent condition while a rating of 0 is a failed condition. As stated above, additional explanatory documents are provided in the spreadsheet.

Inspection Report - Crane Structural System

Location:	Warehouse A - Beam & Rail Elements (WEST)
Inspection Date:	9/8/2021 and 9/9/2021
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman

Component	9-0 Condition (Dropdown)	Inspection Notes
W1-W2	6 - Satisfactory	Visual condition assessment. Could not get hands on due to crane placement.
W2-W3	6 - Satisfactory	Beam: TYP CONDITION - rail splice plate has 1 loose bolt; rail has 3/16" gap but appears aligned.
Column - 3W	N - Not Applicable	Beams are tight at top and open 1/2" at bottom; channel for W3-W4 is bent downward and is ~1/8" lower than W2-W3
W3-W4	6 - Satisfactory	Beam: TYP CONDITION. Bearings: loose rail connection near C4 (Cond = 3).
Column - 4W	N - Not Applicable	1/8" gap below beam at north; bolts are tight.
W4-W5	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
W5-W6	6 - Satisfactory	Beam: TYP CONDITION - rail splice plate has 1 loose bolt.

Figure 19 – Typical beam-rail notes

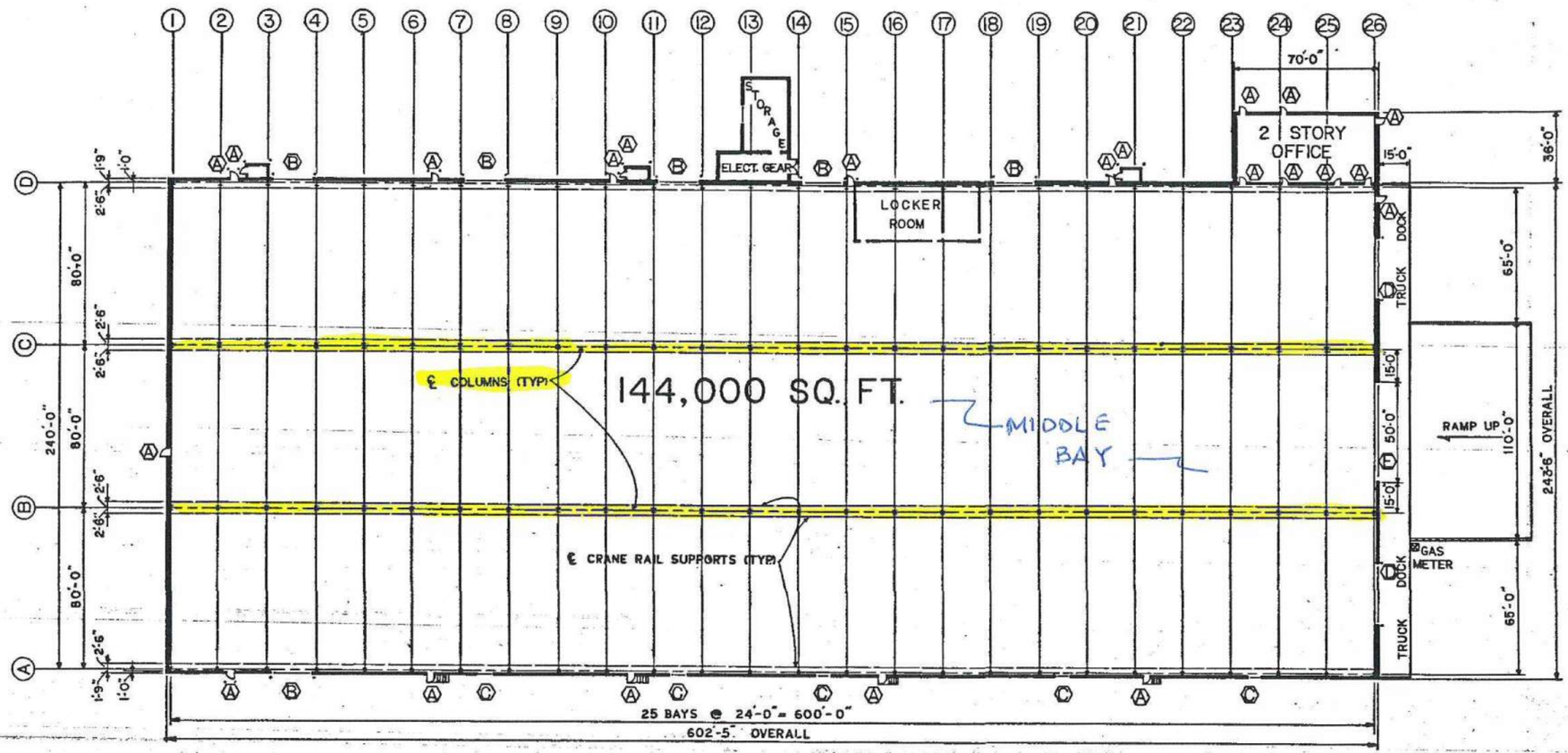
Maintenance Recommendations – Beams & Crane Rails

The following recommendations are based on the safety inspection and Osborn's site visit. Other specific recommendations are listed in Appendix B combined with representative photos.

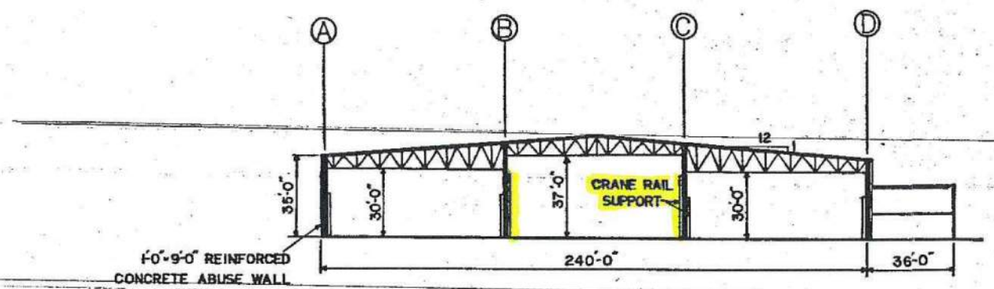
1. All horizontal surfaces had dirt, debris, grease, oil, corrosion flakes and metal shards on them. Good maintenance practices recommend that these areas (flanges, seats and bearings, rail splices and plates) be cleaned by power washing or equal, especially prior to inspections so that cracks, deficiencies and other elements can be clearly visualized. After this has been accomplished, steel areas should be cleaned and repainted.
2. Align all crane rails and seat them properly.
3. Place a steel splice plate with proper bolts/anchorage at the crane rail section West, W12-13 and align the rails.
4. After repairs are completed to columns and the beam/rail sections, remove the temporary stop located near C20.
5. Align any channel members that are distorted or out-of-alignment.
6. Tighten all loose bolts to the proper torque and place steel or neoprene shims as needed.
7. Depending on the frequency of use, the available capacity of the crane rails should be determined. In addition, all superstructure (girders) and substructure (columns, GP's, knee braces, diaphragms and supporting units) elements should receive a load rating. Fatigue in these types of elements is a major concern and should also be investigated.

Lastly, in regards to the end connection detail shown in Figure 16 and sketch provided in Appendix E, our engineers are concerned about possible cracking of the welds due to the intersecting welds between the flange and web and the direct tension on the flange welds of this detail. It appears to be an odd detail to allow expansion for the crane rails while maintaining a constant top of steel for the crane rails to run on/over. If possible, a spliced section across the bottom flange with a longer plate to transfer the flange force in shear rather than tension could be used. If more information or a sketch is required, our engineers would be happy to provide this detail.

APPENDIX A



PLAN VIEW
SCALE: 1"=30'-0"



SECTION AT 25
SCALE: 1"=30'-0"

0 10 20 30 40 50 60 70 80 90 100
SCALE IN FEET

DOOR SCHEDULE

- (A) – 3'-0" × 7'-0"
- (B) – 20'-0" × 18'-0"
- (C) – 8'-0" × 8'-0" (TRUCK DOCK)
- (D) – 30'-0" × 22'-0"
- (E) – 50'-0" × 22'-0"

NOTE: ALL DOORS EXCEPT TYPE (A) DOORS ARE OVERHEAD ROLLING STEEL DOORS.

EDA PROJECT NO. 06-1-00998
HOAG WISMAR JOB NO. 1220

BUILT IN 1975

PORT OF CLEVELAND
CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY

REVISED	BY	DATE

WAREHOUSE "A"

GENERAL PLAN AND SECTION OF BUILDING

DESIGNED DATE	F.H. 2-12-86 DRAWN DATE	CHECKED DATE
APPROVED BY		SCALE AS NOTED
E HIRSIMAKI CHIEF ENGINEER DATE		DWG. NUMBER 2586-1
C. T. BURKE DIRECTOR DATE		

Appendix B

Maintenance Recommendations and Photo Log

Maintenance Recommendations			
Port of Cleveland - Warehouse A			**J2021206.000**
Maintenance Issue or Noted Recommendation	**Coding Level**	**Figure Note**	**Locations**
Typical loose bolted connections on rail splice	**2**	**A**	Multiple - see worksheet
Cross-bracing or angles dented, kinked and/or severely impacted	**1**	**B**	Multiple - see worksheet
Typical loose tie-back or rail hold-down anchor	**2**	**C**	Multiple - see worksheet
Concrete-encasement cracked and/or spalled	**2 / 4**	**D**	Multiple - see worksheet
Column severely impacted - replacement required	**1**	**E**	C4E, C8E, C7W and C20W
Column requires heat-straightening on lower portion and/or a concrete encasement be added	**1 / 3**	**F**	Multiple - see worksheet; prioritize
Prioritize column repairs - then begin program to add concrete encasement to high volume bays	**4**	**G**	
Clean beam, channel, rail and bearing areas and paint	**3 / 4**	**H**	Multiple - see worksheet
Add missing splice plate and connection anchors	**1**	**J**	W12-W13
Place shims (steel or neoprene) as needed below beams for bearing at columns	**3**	**K**	Multiple - see worksheet
Place steel shims or equal to stabilize the crane rail	**2**	**L**	C13E and C16E
Montor beam variance at tops of columns and denote at next inspection	**3**	**M**	C24E and C3W
Structure Washdown	**5**	-	

Figure A

Figure B

Figure C

Figure D

Figure E

Figure F

Figure G

Figure H

Figure J

Figure K

Figure L

Figure M

Figure N

Figure P

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MAINTENANCE RATING SCALE

	LEVEL	CONDITION	APPROX. REMAINING SERVICE LIFE
Safety or Emergency Item (Immediate concern/issue)	1	Poor - through holes, heavy pitting, corrosion, possible section loss, buckling or distortion & twist/kinking	1 to 3 years
Reactive Items	2	Poor / Fair - pitting, rust and corrosion in scattered areas. Minor kinks or dents noted. Loose bolts or connections.	4 to 8 years
Planned Maint. Activity	3	Fair to Good - minor issues and/or deficiencies	10 to 15 years
Future or Long-Term Maintenance	4	Good Condition; could have isolated, minor issues	20+ years
Housekeeping or PM Activity	5	New or excellent condition	30+ years

Appendix C

Beam & Crane Rail Report

EAST BEAMS & CRANE RAILS

Inspection Report - Crane Structural System

Location:	Warehouse A - Beam & Rail Elements (EAST)
Inspection Date:	9/8/2021 and 9/9/2021
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman

Component	9-0 Condition (Dropdown)	Inspection Notes
E1-E2	6 - Satisfactory	Visual condition assessment. Could not get hands on due to crane placement.
E2-E3	6 - Satisfactory	Beam: TYP CONDITION - rail splice plate and rail slightly misaligned, but all bolts tight.
Column - 3E	N - Not Applicable	Beams have 1/2" gap at bottom to 3/4" at top but are aligned. Bearing bolts on bottom flange are loose.
E3-E4	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION. Crane rail and splice have 1/8" gap.
E4-E5	5 - Fair	Beam: TYP CONDITION - rail at splice plate is slightly out of alignment causing shiny surface, bolts all tight.
Column - 5E	5 - Fair	Beams slightly out of alignment; W4-W5 has gap below brg (able to insert rule). Translates to top channel (south lower than adjacent).
E5-E6	5 - Fair	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
E6-E7	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
Column - 7E	N - Not Applicable	Beams are slightly out of alignment (Cond = 5) and crane rail has very small gap between sections.
E7-E8	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION

Inspection Report - Crane Structural System

Location:	Warehouse A - Beam & Rail Elements (EAST)	
Inspection Date:	9/8/2021 and 9/9/2021	
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman	
E8-E9	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
Column - 9E	N - Not Applicable	There is a gap below the rail on north side along ~15".
E9-E10	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
E10-E11	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
Column - 11E	N - Not Applicable	Crane rail splice is slightly out of alignment and causing shiny surface and rubbing on inside.
E11-E12	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
E12-E13	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
Column - 13E	N - Not Applicable	Slight gap below crane rail along 1'; bolt in lower flange of W BM able to be turned by hand - very loose with 1/4" gap below.
E13-E14	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
E14-E15	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
E15-E16	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION

Inspection Report - Crane Structural System

Location:	Warehouse A - Beam & Rail Elements (EAST)	
Inspection Date:	9/8/2021 and 9/9/2021	
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman	
Column - 16E	N - Not Applicable	Channel section on 15-16 is slightly lower than 16-17; 1/8" gap below crane rail over 3 ft and goes back to flush beyond.
E16-E17	7 - Good	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
Column - 18E	N - Not Applicable	1¼" open between beams. Similar detail to Column 18W
E18-E19	7 - Good	Channels, bolts and rails: Cond = 6
E19-E20	6 - Satisfactory	Beam: TYP CONDITION - splice plate has few loose bolts.
E20-E21	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
E21-E22	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
E22-E23	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
E23-E24	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
E24-E25	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
E25-E26	7 - Good	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION

Inspection Report - Crane Structural System

Location:	Warehouse A - Beam & Rail Elements (EAST)
Inspection Date:	9/8/2021 and 9/9/2021
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman

Areas denoted where end connection detail is found

MAINTENANCE RATING & RECOMMENDATIONS

Level 1	Level 2	Level 3	Level 4	Level 5

See rating Scales Tab for descriptions of Levels and Maintenance

	Level 1	Level 2	Level 3	Level 4	Level 5	Maintenance Recommendation Notes
E1-2			X			Clean & paint
E2-3			X			Clean & paint
C3E						Place shims and tighten bolts
E3-4			X			Clean & paint
E4-5			X			Clean & paint
C5E			X			Shim as needed, align beams, tighten all bolts and connections
E5-6			X			Clean & paint
E6-7			X			Clean & paint
C7E						
E7-8			X			Tighten loose bolts, clean & paint

MAINTENANCE RATING & RECOMMENDATIONS

	Level 1	Level 2	Level 3	Level 4	Level 5	See rating Scales Tab for descriptions of Levels and Maintenance
E8-9			X			Clean & paint
C9E						Shim and tighten down crane rail
E9-10			X			Tighten loose bolts and align crane rail
E10-11			X			Clean & paint
C11E						Align rails, place washers as needed and tighten down
E11-12			X			Clean & paint
E12-13			X			Clean & paint
C13E		X				Add shim or plate below crane rail section and tighten loose bolt.
E13-14			X			Clean & paint
E14-15			X			Clean & paint
E15-16			X			Clean & paint

MAINTENANCE RATING & RECOMMENDATIONS

	Level 1	Level 2	Level 3	Level 4	Level 5	See rating Scales Tab for descriptions of Levels and Maintenance
C16E		X				Place steel shims or equal to stabilize crane rail.
E16-17			X			Clean & paint
C18E						
E18-19			X			Clean & paint
E19-20			X			Clean & paint
E20-21			X			Clean & paint
E21-22			X			Clean & paint
E22-23			X			Clean & paint
E23-24			X			Clean & paint
E24-25			X			Clean & paint
E25-26			X			Clean & paint

WEST BEAMS & CRANE RAILS

Inspection Report - Crane Structural System

Location:	Warehouse A - Beam & Rail Elements (WEST)
Inspection Date:	9/8/2021 and 9/9/2021
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman

Component	9-0 Condition (Dropdown)	Inspection Notes
W1-W2	6 - Satisfactory	Visual condition assessment. Could not get hands on due to crane placement.
W2-W3	6 - Satisfactory	Beam: TYP CONDITION - rail splice plate has 1 loose bolt; rail has 3/16" gap but appears aligned.
Column - 3W	N - Not Applicable	Beams are tight at top and open 1/2" at bottom; channel for W3-W4 is bent downward and is ~1/8" lower than W2-W3
W3-W4	6 - Satisfactory	Beam: TYP CONDITION. Bearings: loose rail connection near C4 (Cond = 3).
Column - 4W	N - Not Applicable	1/8" gap below beam at north; bolts are tight.
W4-W5	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
W5-W6	6 - Satisfactory	Beam: TYP CONDITION - rail splice plate has 1 loose bolt.
W6-W7	6 - Satisfactory	Beam: TYP CONDITION - rail splice plate has 3 loose bolts (Cond = 3).
Column - 7W	N - Not Applicable	At column, beams are out of alignment; gap between crane rail along ~15".
W7-W8	6 - Satisfactory	Beam: TYP CONDITION - rail splice plate has 1 loose bolt just south of C8.

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W8-W9	6 - Satisfactory	Beam: TYP CONDITION - bolt is completely loose (Cond = 3) at lower flange C9; webs of beams at C9 are out of alignment.
W9-W10	6 - Satisfactory	Beam: TYP CONDITION - rail splice plate north of C9 has loose bolts; crane rail is misaligned.
W10-W11	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
W11-W12	6 - Satisfactory	Beam: TYP CONDITION - rail splice plate has 2 loose bolts (Cond = 4); rail is slightly offset/shifted and misaligned.
W12-W13	6 - Satisfactory	Beam: TYP CONDITION - crane rail is missing splice plate ~7' south of C13W (Cond = 3); gap in the rail, nicks/gouges along perimeter; offset slightly.
W13-W14	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
Column - 14W	N - Not Applicable	The lower bolt connecting W14-W15 beam section is loose.
W14-W15	6 - Satisfactory	Beam: TYP CONDITION - bolted connection at C14 is loose (Cond = 3).
Column - 16W	N - Not Applicable	Beams are offset slightly.
W15-W16	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
W16-W17	6 - Satisfactory	Beam: TYP CONDITION - loose bolt at bottom flange of C16 (Cond = 3).

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W17-W18	8 - Very Good	Visual condition assessment. Could not get hands on due to coils along perimeter.
Column - 18W	N - Not Applicable	Noted end connection detail at column with shim plates and welded lower flange. Weld looks in good condition.
W18-W19	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
W19-W20	6 - Satisfactory	Beam: TYP CONDITION - loose nut near mid-span.
Column - 20W	2 - Critical	Out of alignment; north channel of rail base is 3/8" lower than south and slightly pushed toward west (from impact?).
W20-W21	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
W21-W22	6 - Satisfactory	Beam: TYP CONDITION - loose connection bolts in splice near C21 (Cond = 5) - match mark was placed.
W22-W23	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
W23-W24	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
W24-W25	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION
W25-W26	6 - Satisfactory	Minor pinpoint or spot areas of corrosion; scrapes in areas, paint/coating thin and has faded areas. TYP CONDITION

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Areas denoted where end connection detail is found

MAINTENANCE RATING & RECOMMENDATIONS

Level 1	Level 2	Level 3	Level 4	Level 5

See rating Scales Tab for descriptions of Levels and Maintenance

	Level 1	Level 2	Level 3	Level 4	Level 5	Maintenance Recommendation Notes
W1-2			X			Clean & paint
W2-3			X			Tighten loose bolt, clean & paint
C3W						Monitor and denote at next inspection
W3-4			X			Place shims and tighten bolts and rail connections
C4W						Place shims as needed
W4-5			X			Clean & paint
W5-6			X			Tighten loose bolt, clean & paint
W6-7			X			Tighten loose bolts, clean & paint
C7W		X				Shim as needed, align beams, tighten all bolts and connections
W7-8			X			Tighten loose bolt, clean & paint

MAINTENANCE RATING & RECOMMENDATIONS

	Level 1	Level 2	Level 3	Level 4	Level 5	See rating Scales Tab for descriptions of Levels and Maintenance
W8-9	X					Shim as needed, align beams, tighten all bolts and connections
W9-10			X			Tighten loose bolts, clean & paint
W10-11			X			Clean & paint
W11-12		X				Tighten loose bolts and align crane rail
W12-13		X				Add splice plate and bolted connections as needed; clean & paint beam
W13-14			X			Clean & paint
C14W			X			Shim as needed, tighten bolt and clean & paint beam
W14-15			X			Tighten loose bolt, clean & paint
C16W						
W15-16			X			Clean & paint
W16-17			X			Tighten loose bolt, clean & paint

MAINTENANCE RATING & RECOMMENDATIONS

	Level 1	Level 2	Level 3	Level 4	Level 5	See rating Scales Tab for descriptions of Levels and Maintenance
W17-18			X			Clean & paint
C18W			X			Clean & paint around entire perimeter of bearing
W18-19			X			Clean & paint
W19-20			X			Tighten loose nut, clean & paint
C20W	X					See column recommendations. Make sure when column is replaced that beams, rail and all members are aligned.
W20-21			X			Clean & paint
W21-22			X			Tighten loose bolts, clean & paint
W22-23			X			Clean & paint
W23-24			X			Clean & paint
W24-25			X			Clean & paint
W25-26			X			Clean & paint

Appendix D

Column & Cross-Bracing Report

EAST COLUMNS & BRACING

Inspection Report - Crane Structural System

Location:	Warehouse A - Column Elements (EAST)
Inspection Date:	9/8/2021 and 9/9/2021
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman

Component	9-0 Condition (Dropdown)	Inspection Notes
Column - C1	8 - Very Good	Minor scrapes on paint.
Column - C2	7 - Good	Concrete-encased. Minor concrete impact damage with scrapes, chips and cracks. Loose brg bolt (south).
Column - C3	7 - Good	Concrete-encased. Minor concrete impact damage. Scrapes and chips noted.
Column - C4	4 - Poor	Impact damage with dents/kinks (½" to 1½") up to 6' from base. South side flange is twisted clockwise.
X-Bracing (C4L-C5U)	2 - Critical	Gusset is partially encased in concrete. Impact damage causing deflection; bent, dings and corroded.
X-Bracing (C5L-C4U)	2 - Critical	Gusset is partially encased in concrete. Impact damage causing deflection; bent, dings and corroded.
Column - C5	5 - Fair	Impact damage ~3' from base causing minor deflection. Scrapes and cuts with some corrosion beginning.
Column - C6	6 - Satisfactory	Minor impact damage to web ~2' from base; minor gouge in flange. Splice plate above (top/brg) has 1 loose bolt, although rail is flush/aligned.
Column - C7	7 - Good	Concrete-encased. Minor chips and scrapes to concrete.
Column - C8	2 - Critical	Impact damage ~5' from base causing torsion in column from channel bracing attached to main column. Dent noted in web. Loose brg bolt (north).

Inspection Report - Crane Structural System

Location:	Warehouse A - Column Elements (EAST)
Inspection Date:	9/8/2021 and 9/9/2021
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman

Column - C9	6 - Satisfactory	Impact dents/kinks (1/4") ~3' up from base. Web has dent ~5' up from base (possibly impacted).
Column - C10	3 - Serious	Impact dent ~2' from base causing torsion in column. Flange is visibly pushed or dented from ~1' to 6' high.
Column - C11	5 - Fair	1" impact dents/kinks ~6' up from base.
Column - C12	6 - Satisfactory	1½" impact dent ~2' up from base.
Column - C13	6 - Satisfactory	Minor impact dents/kinks (1/4") up ~2' from base. Existing holes in web have minor corrosion beginning - plates have been added.
X-Bracing (C13L-C14U)	2 - Critical	Impact dents/kinks causing deflection and twisting.
X-Bracing (C14L-C13U)	2 - Critical	Impact dents/kinks causing deflection and twisting.
Column - C14	6 - Satisfactory	Impact dents/kinks (¼" to ¾") up ~5' from base.
Column - C15	3 - Serious	Impact dent and damage ~3' up from base causing torsion in column. Noticeable pushed back and twisted flange from base through ~6' up.
Column - C16	6 - Satisfactory	Impact dent/kink 4'-6" up from base.
Column - C17	7 - Good	Minor scrapes on paint. Noted sheared off bolts (6) at top of column - similar to 18E.

Inspection Report - Crane Structural System

Location:	Warehouse A - Column Elements (EAST)
Inspection Date:	9/8/2021 and 9/9/2021
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman

Column - C18	3 - Serious	Visible impact 2' up from causing torsion in column; 1" dent/kink ~5' up from base. Twisting/bent and minor corrosion beginning.
Column - C19	5 - Fair	1.5" impact dent ~7' from base and 1/4" dent/kink ~2' from base.
Column - C20	5 - Fair	1" impact gouge/dent ~6.5' from base and 1/4" impact det on web ~5.5' up from base.
X-Bracing (C22L-C23U)	1 - Imminent Failure	Multiple impact dents/kinks with deflection, twisting and gouges in members.
X-Bracing (C23L-C22U)	1 - Imminent Failure	Multiple impact dents/kinks with deflection, twisting and gouges in members.
Column - C21	6 - Satisfactory	½" to ¾" impact dent ~5' up from base.
Column - C22	6 - Satisfactory	Concrete-encasement is spalled at top exposing rebar and has large, open cracks. Minor dings and corrosion on steel; plates welded on flanges.
Column - C23	6 - Satisfactory	1.5" impact dent ~2' from base. Lower portion of column is corroded throughout all areas.
Column - C24	7 - Good	Concrete-encased. Concrete has spalls and cracks. It appears that circular encasement was then surrounded by larger concrete protection. Bot/BM is tight and at top open 5/8" and W23-24 is slightly higher.
Column - C25	5 - Fair	Impact dents/kinks (1/2") ~4' up from base; existing olt holes in flanges ~14' from base have corrosion surrounding them.
Column - C26	7 - Good	Minor scrapes on paint.

Inspection Report - Crane Structural System

Location:	Warehouse A - Column Elements (EAST)
Inspection Date:	9/8/2021 and 9/9/2021
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman

Areas of concrete-encasement on column

MAINTENANCE RATING & RECOMMENDATIONS

Level 1	Level 2	Level 3	Level 4	Level 5

	Level 1	Level 2	Level 3	Level 4	Level 5	Maintenance Recommendation Notes
C1E					X	Clean & paint
C2E				X		Tighten bolt
C3E				X		
C4E	X					Impacted portion, or complete member, should be replaced
XB4-5	X					Member should be replaced
XB5-4	X					Member should be replaced
C5E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C6E			X			Areas of impact should be heat-straightened and/or a concrete protection put into place (lower 6'); tighten bolt.
C7E				X		
C8E	X					Impacted portion, or complete member, should be replaced; tighten bearing bolt

MAINTENANCE RATING & RECOMMENDATIONS

	Level 1	Level 2	Level 3	Level 4	Level 5	
C9E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C10E		X				Consider replacing member or strengthening
C11E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C12E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C13E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet. Add additional tack welds on back of upper gusset PL.
XB13-14	X					Member should be replaced
XB14-13	X					Member should be replaced
C14E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C15E		X				Consider replacing member or strengthening
C16E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C17E				X		Clean & paint

MAINTENANCE RATING & RECOMMENDATIONS

	Level 1	Level 2	Level 3	Level 4	Level 5	
C18E		X				Consider replacing member or strengthening
C19E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C20E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
XB22-23	X					Member should be replaced
XB23-22	X					Member should be replaced
C21E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C22E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C23E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C24E				X		Monitor beam variance top/bottom and denote at next inspection
C25E			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C26E				X		Clean & paint

WEST COLUMNS & BRACING

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Inspector:	Jeffrey D. Horvath, PE and Charles Hetman

Component	9-0 Condition (Dropdown)	Inspection Notes
Column - C1	7 - Good	Minor scrapes on paint.
Column - C2	8 - Very Good	Minor scrapes, dirty.
Column - C3	7 - Good	Concrete-encased. Minor concrete impact damage.
Column - C4	7 - Good	Concrete-encased. Surface deterioration, spalls and scrapes on concrete.
X-Bracing (C4L-C5U)	2 - Critical	Gusset is partially encased in concrete. Impact damage causing deflection; bent, dings and corroded.
X-Bracing (C5L-C4U)	2 - Critical	Gusset is partially encased in concrete. Impact damage causing deflection; bent, dings and corroded.
Column - C5	7 - Good	Minor scrapes on paint.
Column - C6	5 - Fair	Impact kinks/dents ~2'-6" up from base (dents range from ½" to 1½").
Column - C7	2 - Critical	Impact kinks/dents @ 6' from base (~¾"); web is deformed ½" and column is beginning to twist. Impact to web is approx. 10" from base.
Column - C8	5 - Fair	Multiple impact kinks/dents (~1" to 1½") @ 6' up from base.

Inspection Report - Crane Structural System

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Inspection Date:	9/8/2021 and 9/9/2021	
Inspector:	Jeffrey D. Horvath, PE and Charles Hetman	
Column - C9	7 - Good	1/4" gouge in south flange; minor scrapes on paint.
Column - C10	7 - Good	Concrete-encased. Minor cracks beginning in concrete.
Column - C11	6 - Satisfactory	1/4" impact dent ~2' from base and another at 6' up from base.
Column - C12	5 - Fair	1/4" impact kink/dent 3' up from base; column is showing 1" deflection from 3.5' to 6' from base.
Column - C13	6 - Satisfactory	3/4" impact dent/kink ~2' up from base.
X-Bracing (C13L-C14U)	2 - Critical	Impact dents/kinks causing deflection and twisting.
X-Bracing (C14L-C13U)	2 - Critical	Multiple impact dents causing deflection & distortion of member.
Column - C14	5 - Fair	Multiple impact dents ~5' up from base (¾" to 1½").
Column - C15	5 - Fair	Impact dents/kinks ~5' from base (¼" to 1").
Column - C16	6 - Satisfactory	Impact dents/kinks ~3' from base (¼" to ½").
Column - C17	6 - Satisfactory	3/4" impact dent/kink ~5' up from base.

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Inspector:	Jeffrey D. Horvath, PE and Charles Hetman	
Column - C18	8 - Very Good	Minor scrapes on paint.
Column - C19	7 - Good	Scrapes, dings and dents on lower 3'; pre-cut holes in web in multiple areas.
Column - C20	1 - Imminent Failure	Multiple impact dents, kinks (1" to 1½") up ~8' from base; column is deflected 3" off center ~5' from base on south side.
Column - C21	6 - Satisfactory	Minor impact dents/kinks (½" to 1") up ~5' from base. Existing holes in web have minor corrosion beginning - plates have been added.
Column - C22	6 - Satisfactory	1" impact dent ~5' from base.
X-Bracing (C22L-C23U)	3 - Serious	Impact dents/kinks causing deflection and twisting.
X-Bracing (C23L-C22U)	3 - Serious	Impact dents/kinks causing deflection and twisting.
Column - C23	6 - Satisfactory	Concrete-encased. Large spalls at base of concrete & minor cracking. Web has existing holes with plates and heavy corrosion. Nick on stiffener at top.
Column - C24	3 - Serious	Previously-encased. All concrete has spalled off except in web areas. Multiple impacts and dents (1" to 1.5") up 6' from base; some twisting/deflection.
Column - C25	3 - Serious	1.5" impact dent. Plates (1/4" x 18"H x 9"W) welded onto flanges and then to main structure columns.
Column - C26	7 - Good	Minor scrapes on paint.

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Areas of concrete-encasement on column

MAINTENANCE RATING & RECOMMENDATIONS

Level 1	Level 2	Level 3	Level 4	Level 5

	Level 1	Level 2	Level 3	Level 4	Level 5	Maintenance Recommendation Notes
C1W					X	Clean & paint
C2W					X	Clean & paint
C3W				X		
C4W				X		
XB4-5	X					Members should be replaced
XB5-4	X					Members should be replaced
C5W					X	Clean & paint
C6W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C7W	X					Impacted portion, or complete member, should be replaced
C8W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.

MAINTENANCE RATING & RECOMMENDATIONS

	Level 1	Level 2	Level 3	Level 4	Level 5	
C9W				X		Clean & paint
C10W				X		
C11W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C12W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C13W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
XB13-14	X					Members should be replaced
XB14-13	X					Members should be replaced
C14W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C15W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C16W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C17W			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.

MAINTENANCE RATING & RECOMMENDATIONS

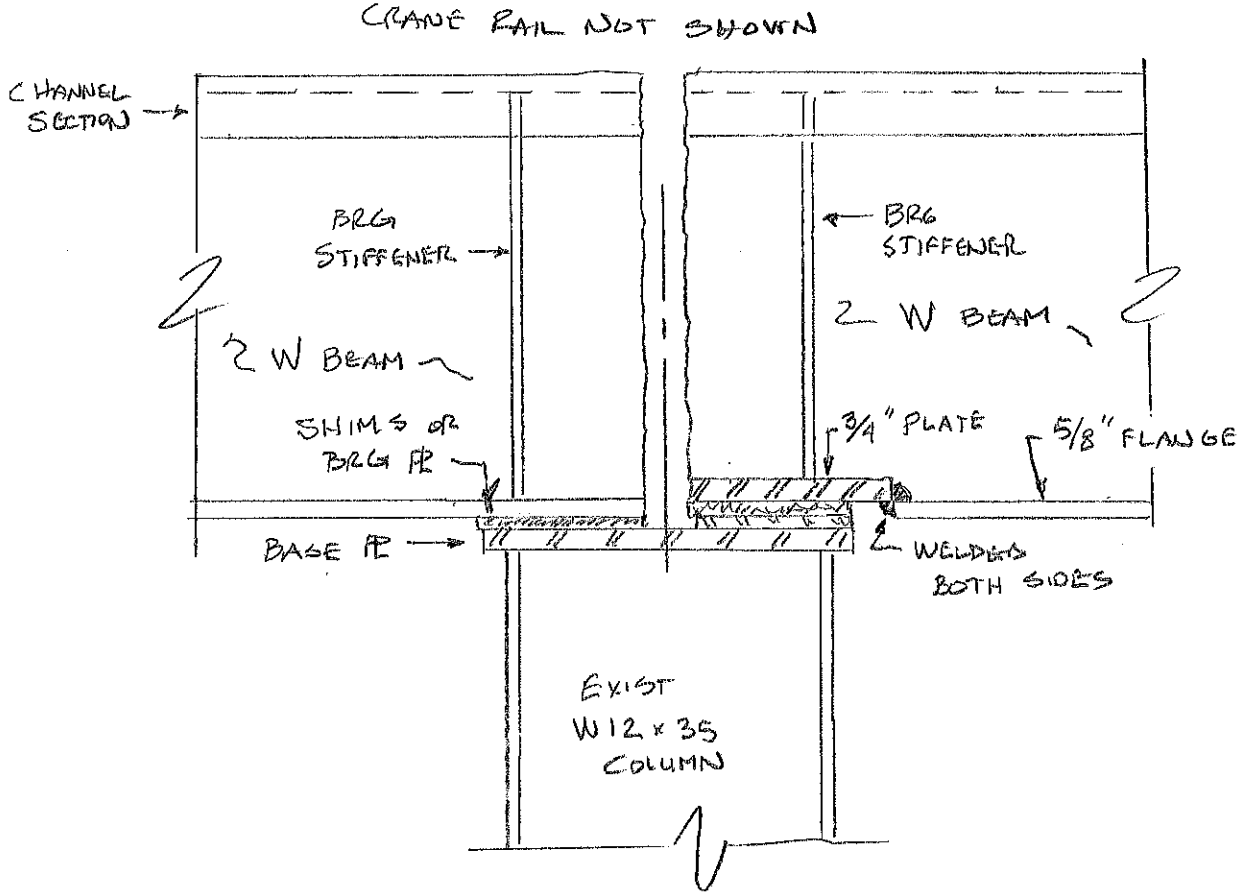
	Level 1	Level 2	Level 3	Level 4	Level 5	
C18W					X	Clean & paint
C19W				X		Heat-straighten impacted areas; clean to white metal areas with holes and place steel plate over by welding all around.
C20W	X					Member should be replaced.
XB22-23			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
XB23-22			X			Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C21W		X				Consider replacing members or strengthening.
C22W		X				Consider replacing members or strengthening.
C23W			X			Patch spalls in concrete
C24W		X				Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C25W		X				Areas of impact should be heat-straightened and/or a concrete jacket protection put into place on lower 6 feet.
C26W					X	Clean & paint

OSBORN ENGINEERING

BY _____ DATE _____ SUBJECT _____ SHEET NO. ___ OF ___

CHKD. BY _____ DATE _____ JOB NO. _____

APPENDIX E



CONNECTION DETAIL

PORT OF CLEVELAND - WAREHOUSE A

Appendix F

Rating Scales

OSBORN ENGINEERING

MAINTENANCE

MAINTENANCE RATING SCALE

	LEVEL	CONDITION	APPROX. REMAINING SERVICE LIFE
Safety or Emergency Item (Immediate concern/issue)	1	Poor - through holes, heavy pitting, corrosion, possible section loss, buckling or distortion & twist/kinking	1 to 3 years
Reactive Items	2	Poor / Fair - pitting, rust and corrosion in scattered areas. Minor kinks or dents noted. Loose bolts or connections	4 to 8 years
Planned Maint. Activity	3	Fair to Good - minor issues and/or deficiencies	10 to 15 years
Future or Long-Term Maintenance	4	Good Condition; could have isolated, minor issues	20+ years
Housekeeping or PM Activity	5	New or excellent condition	30+ years

INSPECTION

Condition Rating Guidelines

NBIS 9-0 – Deck, Superstructure and Substructure SUMMARY Items TOTAL BRIDGE		Inspector Guidelines
9 - Excellent		
8 - Very Good	No problems noted	
7 - Good	Some minor problems	Brief comments as appropriate
6 - Satisfactory	Structural elements show some minor deterioration	Comments as appropriate
5 -Fair	All primary structural elements are sound but have minor section loss, deterioration, spalling or scour	Document deficiencies quantitatively with descriptive comments.
4 - Poor	Advanced section loss, deterioration, spalling or scour	Candidate to establish monitoring parameters with specific locations to track the deficiencies rate-of-change at the next inspection. In addition to quantitative documentation take photos, make sketches and/or establish monitoring control points.
3 - Serious	Loss of section, deterioration, spalling or scour has seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present	Document deficiencies quantitatively with descriptive comments; establish monitoring benchmarks. Discuss with Program Manager, structure may be prone to localized failures.
2 - Critical	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken	Document deficiencies quantitatively with descriptive comments; establish monitoring benchmarks. Contact Program Manager; candidate to dispatch repairs and or road closure. Confirm in writing.
1 - Imminent Failure	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put bridge back into light service	Dispatch personnel for immediate closure. Notify Program Manager. Confirm in writing.
0 - Failed	Out of service - beyond corrective action	

OSBORN ENGINEERING

Superstructure

Item - **9. Alignment** (of members)
Type - **All**

Primary members should be examined for misalignment. Note loose connections and differential bending. Secondary members are a good location to note misalignment of primary members.

Sight down the edge of the superstructure and note any vertical misalignment or horizontal sweep. For prestressed superstructures especially note any sagging or camber revealing loss of the prestressing. Inspect highly skewed bridges for misalignment of the webs. Note Part 1 and the Appendix of this manual for damage inspection reporting requirements. The Appendix has a detailed damage-inspection form for measuring impacts to steel beams.

Rating	Condition	Primary Members
9	Excellent	
8	Very Good	No noticeable misalignment or distortion
7	Good	Minor misalignment or distortion due to construction
6	Satisfactory	Moderate misalignment or distortion due to impact
5	Fair	Out of plane distortion of tension zones/members. Moderate misalignment or distortion due to impact *(example – up to 2" localized sweep of bottom flange on multi-beam steel bridge)*
4	Poor	Vertical deflection (sag) due to deteriorations or excessive dead loads. Major misalignment or distortion due to impact *(example - more than 2" sweep of bottom flange on 2 beams on a multi-beam steel*). Up to 1/8" horizontal movement for every 1-foot vertical on web of a steel beam.
3	Serious	Vertical sag up of the span due to distortion (*example 2-inch sag for a 100' span*). More than 1/8" horizontal movement for every 1-foot vertical on a steel beam web.
2	Critical	Vertical sag up of the span due to distortion (*example more than 2-inch sag for a 100' span*) Out of plane distortion of compression zones/members. More than 1/4" horizontal movement for every 1-foot vertical on a steel beam web.
1	Im. Failure	Any condition worse than above
0	Failed	

ALIGNMENT RATING SCALE

OSBORN ENGINEERING

Superstructure

Item - **10. Beams/Girders/Slab**

Type – **Steel**

	Condition	*Section Loss and Deterioration	**Cracks
9	Excellent	None	
8	Very Good	No measurable section loss or very minor section loss	
7	Good	Insignificant section loss, minor	Minor problems; repaired, arrested or retrofitted cracks
6	Satisfactory	Minor section loss *(ex. corr. hole in redundant fascia web or any interior beam stiffener or behind a bearing, Minor pitting, isolated areas of loss throughout member,)* some areas of deterioration	Some minor deterioration; Broken welds possible but no cracks in the base metal
5	Fair	Beams are sound with some deterioration, moderate section loss (*ex. Some areas of heavy pitting under expansion joints, corrosion hole allowed only in fascia beams in redundant structure, less than 1/3 loss in flanges in max-bending regions)*	Minor cracking *(ie. small, all less than 2" long, stable cracks in base metal in compression zone, cracks in weld metal)*
4	Poor	Advanced section loss *(ex. 1 non redundant or interior member with more than 1/3 loss in flange at flexure zone or more than 50% loss in web at supports, corrosion hole in interior or non redundant beam)*	Fatigue or out-of-plane bending cracks *(ie. cracks, any longer than 2" in compression zone, or small crack(s) in tension zone)*. **Note**: any crack in the base metal of a FCM parallel to the primary stress shall be "Poor" or less.
3	Serious	Section loss is seriously affecting beams, local failures are possible *(ex. Extensive perforations or loss through beams, perforations through many beams)*	Fatigue or out-of-plane bending cracks *(ie. several cracks, any longer than 2" in compression zone, or several small crack(s) in tension zone)*. Multiple out of plane or fatigue cracks in one beam. **Note**: any crack in the base metal of a FCM perpendicular to the primary stress shall be "Serious" or less.
2	Critical	Advanced deterioration *(ex. One beam is crushing)* lane should be closed or closely monitored. Distortion in a load path of a redundant member	Advanced deterioration, cracks have removed support or load path in base metal *(ex. many working crack(s) in more than one location or longer than 2", on the same beam and in tension zones)*
1	Imminent Failure	Major section loss, deterioration or cracking that is worse than above *(ex. Beams are crushing)* and closed to traffic. Distortion in a load path of a non redundant member	
0	Failed	Beyond corrective action	

* Section loss is highly dependent on location, extent and severity; see the table for spot measurements on the following page.**Minor versus advanced cracking depends on the probability of propagation, location & length and may be given to the judgment of the Team

STEEL BEAM RATING SCALE

OSBORN ENGINEERING

Superstructure

Item - **11. Diaphragms or Cross frames**
Type - **All**

On structures that are highly skewed, >30 degrees, or horizontally curved inspect for buckling of the crossframes or diaphragms and allow this item to influence the Summary. End dams are not to control the X-frame rating but they may influence the rating depending on severity and extent.

Rating	Condition	Amount of Bracing with Deficiencies	Cracking Connections-welds & fasteners	Section loss, damage, distortion, deflection
9	Excellent			
8	Very Good	Some minor deficiencies		
7	Good	Less than **10**% with minor deficiencies	Cracks have been retrofitted or arrested. Connectors are tight and secure.	Minor damage to member
6	Satisfactory	**Up to 25**% with minor deficiencies, or 10% with moderate	Minor cracks, some loose connectors.	Moderate damage, corrosion holes through a couple end dams
5	Fair	**up to 50%** with moderate deficiencies	Minor cracks, some loose connectors.	Very little misalignment of member
4	Poor	More than **half** with moderate deficiencies	Loose connections, crack through one member or connectors	Major damage to tension member (highly skewed, horizontally curved superstructure)
3	Serious	Major deficiencies	Loose connections, cracks in multiple members of connectors	Out of plane distortion in compression member (highly skewed, horizontally curved superstructure)
2 1 0	Critical Imminent Failure Failed	Any worse than above Loss of several adjacent members in one transverse plane.		

CROSS-BRACING RATING SCALE